UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,176	01/14/2005	Hiroshi Okamura	OKAMURA6	2935

1444 7590 08/17/2010

BROWDY AND NEIMARK, P.L.L.C.
624 NINTH STREET, NW
SUITE 300
WASHINGTON, DC 20001-5303

EXAMINER	
BHAT, NARAYAN KAMESHWAR	
ART UNIT	PAPER NUMBER
1634	
MAIL DATE	DELIVERY MODE
08/17/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/521,176	OKAMURA ET AL.	
	Examiner	Art Unit	
	NARAYAN K. BHAT	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 May 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17,19-21,31 and 32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17, 19-21, 31 and 32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 20, 2010 has been entered.

Claim Status

2. Claims 17, 19-21 and 31-32 are pending in this application and are under prosecution. Applicant's arguments filed on May 17, 2010 have been fully considered and addressed following rejections.

Priority

3. Applicant has submitted the certified English translation of the priority document JP 2002-207866 (filed on July 7, 2002) and JP2002-275797 (filed on September 20, 2002) in the copending divisional application 12/246,152. Applicant states that when the priority documents were translated from the Japanese, "polyallylamine" was mistranslated as "polyarylamine" (Remarks, November, 12, 2009, pg. 16). Applicant has submitted the non-certified English translation of the said priority documents on May 14, 2009 in the instant application has support for the claimed “polyarylamine” but not for polyallylamine. Since the certified English translations of the priority documents in the

instant application have not been received, Applicant is requested to clarify the discrepancies between the non-certified English translation of the priority documents submitted in the instant application versus the certified English translation submitted in the copending divisional '152 application.

Affidavits

4. The affidavits and support documents filed under 37 CFR 1.132 by one of the Applicant (Yamano) on May 17, 2010 highlighting the alleged differences between the claimed solid support and the support of Mao et al are noted. However, as discussed below, the affidavits and support documents provided are not enough to overcome the obviousness rejections set forth in this office action.

Applicant compares the DNA chip formed on a silicon substrate further modified by a DLC layer having a thickness of about 25 nm with that of the support of Mao et al. The solid support of the claimed invention as recited in the instant claim 17 merely requires a substrate, an electrostatic layer on the substrate, a chemically modifying layer containing a carboxyl group capable of forming a covalent bond with the nucleic acid, but does not require a DLC layer of 25 nm thickness. Therefore, results presented in the Figure 1 of the Applicant are not commensurate in scope of the invention as claimed. Furthermore, the alleged assertion by the Applicant that the signals of the porous substrate overlap considerably and needed longer blocking time and did not satisfy the required level of uniformity as compared to the claimed solid substrate (Fig. 1 and Affidavits, pg. 3) are not commensurate in scope of the invention as claimed

because the solid support used for immobilization of DNA has been further modified with DLC layer and is not the same as the claimed solid support. Furthermore, "the required level" is not a claimed feature of the solid support.

Applicant also acknowledged that Mao et al teaches a silicon substrate (Affidavits, pg. 2), which is the preferred substrate as recited in the instant specification (USPGPUB, paragraph 0029). Also, the results presented by the Applicant are not commensurate in scope of the invention because the solid support used was different from the claimed solid support.

Furthermore, as discussed below, the solid support of Mao et al in view of Mirus et al has the claimed structural components and therefore meets the limitations of the solid support as claimed in instant claim 17 (MPEP 2114). Therefore, the affidavits and the supporting documents provided by Applicant are not sufficient to overcome the rejections as set forth in this office action.

Claim Interpretation

5. Instant claim 17 as recited does not require the carboxyl group on the chemically modifying layer to bond the nucleic acid covalently to the chemically modifying layer.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

> invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 17, 19-20 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mao et al (USPGPUB 20030124332, effective filing date Aug. 28, 2001) in view of Mirus et al (WO 01/02538 published Jan. 11, 2001).

The previous rejection is maintained.

Claim 17 recites the following structural components: a) a substrate, b) positively charged electrostatic layer on the substrate, c) a chemically modifying layer containing a carboxyl group on the electrostatic layer and d) a nucleic acid molecule covalently bonded to the chemically modifying layer.

Mao et al teaches structural components 'a' to 'c' and Mirus et al teaches structural component 'd' as discussed below.

Regarding structural component 'a', Mao et al teaches a substrate (Fig. 1F and paragraph 0046).

Regarding structural component 'b', Mao et al teaches a first layer (i.e., an electrostatic layer) comprising a positively charged amino group compound on the substrate (Fig. 1F, paragraphs 0046 and 0069).

Regarding structural component 'c', Mao et al teaches a second layer (i.e., a chemically modifying layer) on the electrostatic layer (Fig. 1F, paragraph 0046) and further teaches that the second layer comprises a polyacrylic acid layer (paragraph 0069) containing carboxyl functional groups (paragraph 0105) capable of covalently binding to a nucleic acid molecule (paragraph 0045). While, Mao et al suggests bound nucleic acid, the reference does not explicitly teach a nucleic acid molecule bonded covalently to the chemically modifying layer.

Regarding claim 19, Mao et al teaches a solid support wherein the first layer (i.e., an electrostatic layer) comprises the amino group-containing polymer polylysine (paragraph 0069) and further teaches that the polymer binds to the substrate by an electrostatic interaction (paragraph 0018), thus teaching an amino group containing compound that does not covalently bind to the substrate.

Regarding claim 20, Mao et al teaches that the first layer (i.e., an electrostatic layer) comprises an amino group-containing compound (paragraph 0069) and further teaches that the polymer binds to the substrate through covalent bonds (paragraph 0018). Mao et al also teaches that the first layer comprising of amino group forms an amide bond with the carboxyl group of the polymer of the second layer (paragraph 0099) thus teaching a compound containing an amino group at the terminus to which the substrate does not bind.

Regarding claim 31, Mao et al clearly suggest nucleic acid molecules are immobilized on the solid support (paragraph 0045) but do not teach immobilizing the nucleic acid molecules as a spot.

As described above, Mao et al suggest nucleic acid bound to the substrate. Mao et al do not explicitly teach a nucleic acid molecule bonded covalently to the chemically modifying layer.

However, a nucleic acid molecule bonded covalently to the chemically modifying layer and immobilizing nucleic acid as a spot were known in the art before the claimed invention was made as taught by Mirus et al.

Mirus et al teaches a solid support for nucleic acid immobilization comprising a substrate (pg. 4, line 30) and further teaches a chemically modifying layer, (i.e., a polyanion layer of polyacrylic acid) that has a carboxyl functional group (pg. 5, lines 3-9). Mirus et al further teaches that the nucleic acid molecule bonded covalently to the chemically modifying layer (pg. 3, lines 7-10).

Mirus et al also teaches that the nucleic acid molecule is immobilized as a spot (pg. 10, lines 3 and 29-30).

Both Mao et al and Mirus et al teaches that the substrate comprises glass (Mao et al, paragraph 0029; Mirus et al pg.3, lines11-12). As described above, Mao et al suggest the binding of nucleic acids to the functional groups on the surface of the chemically modified layer comprising polyacrylic acids (pg. 8, lines 23-27). Mirus et al teaches covalent binding of nucleic acids to the functional groups on the surface of the chemically modified layer comprising polyacrylic acids and immobilizing nucleic acids as

a spot on the substrate, thus meeting the limitation of the structural components recited in claims 17 and 31.

Mirus et al also teaches that the covalent binding of nucleic acids increases the concentration of the nucleic acid probes irrespective of their size on the support, thereby enhancing the sensitivity of target detection (Tables 1-4, pg. 15, lines 9-13).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to modify the nucleic acid immobilization to the substrate of Mao et al with the covalent attachment of nucleic acids on the substrate of Mirus et al with a reasonable expectation of success.

An artisan having ordinary skill in the art would be motivated to modify the nucleic acid immobilization to the substrate of Mao et al with the expected benefit of covalent binding of nucleic acids to the substrate thereby increasing the concentration of the nucleic acid probes irrespective of their size on the support and enhancing the sensitivity of target detection as taught by Mirus et al (Tables 1-4, pg. 15, lines 9-13).

9. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mao et al (USPGPUB 2003/0124332, effective filing date Aug. 28, 2001) in view of Mirus et al (WO 01/02538 published Jan. 11, 2001) as applied to claims 17 and 19 as above and further in view of Woo et al (USPN 5,929,194 issued July 27, 1999).

The previous rejection is maintained.

The teachings of Mao et al and Mirus et al regarding claims 17 and 19 are described above in section 8.

Regarding claim 21, Mao et al teaches a variety of amino groups containing compounds including the polylysine (paragraph 0019). Mao et al and Mirus et al do not teach the amino group containing compound polyarylamine. However, the amino group containing compound polyarylamine was known in the art before the claimed invention was made as taught by Woo et al.

Woo et al teaches a polyarylamine compound for coating the glass substrate and forming films on the substrate carrying positive charges (column 1, line 60 and column 4, lines 8-10). Woo et al further teaches that the coating with the polyarylamine makes the substrate solvent resistant (column 4, lines 10-11, column 14, lines 13-17).

It would have been prima facie obvious to one having the ordinary skill in the art at the time the claimed invention was made to modify the amino group containing compound of Mao et al with the polyarylamine compound of Woo et al with a reasonable expectation of success.

An artisan having ordinary skill in the art at would be motivated to modify the amino group containing compound of Mao et al with the expected benefit of having the polyarylamine compound for coating the substrate for making the substrate solvent resistant as taught by Woo et al (column 14, lines 13-17).

10. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mao et al (USPGPUB 2003/0124332, effective filing date Aug. 28, 2001) in view of Mirus et al (WO 01/02538 published Jan. 11, 2001) as applied to claim 17 as above and further in view of Bertrand et al (Macromol. Rapid Commun., 2000, 21, 319-348).

The previous rejection is maintained.

The teachings of Mao et al and Mirus et al regarding claim 17 are described above in section 8.

Regarding claim 32, Mao et al teaches that that the electrostatic layer comprises of varying thickness (paragraph 0102). Mao et al and Mirus et al do not teach the thickness of the electrostatic layer is 1 nm to 500 microns. However, the thickness of the electrostatic layer was known in the art at the time of the claimed invention was made as taught by Bertrand et al.

Bertrand et al teaches a glass solid support comprising an electrostatic layer, wherein the thickness of the electrostatic layer is from few angstroms to a micrometer (Fig. 1 and pg. 319, column 2, lines 4-5, pg. 329, Useful substrates section). The electrostatic layer of one micrometer thickness of Bertrand et al is in the claimed range of 1 nm to 500 micron. Bertand et al further teaches that the electrostatic layer is very stable against mechanical stress or solvents (pg. 325, column 1, lines 1-3).

It would have been prima facie obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the thickness of electrostatic layer of Mao et al with the electrostatic layer of a micrometer thickness of Bertrand et al with a reasonable expectation of success.

An artisan having ordinary skill in the art at would be motivated to modify the thickness of electrostatic layer of Mao et al with the expected benefit of having a micrometer thick electrostatic layer, which is very stable against mechanical stress or solvents as taught by Bertrand et al (pg. 325, column 1, lines 1-3).

11. Claims 17, 19-20, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over White (Thesis submitted to MIT, June 2002, pgs. 1-49, publication date June 17, 2002) in view of Mirus et al (WO 01/02538 published Jan. 11, 2001). Alternatively, claims 17, 19-20, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mirus et al (WO 01/02538 published Jan. 11, 2001) in view of White (Thesis submitted to MIT, June 2002, pgs. 1-49, publication date June 17, 2002)

The following is a new rejection.

Regarding claim 17, White teaches the structural components 'a' to 'c' and Mirus teaches the structural component 'd' as discussed below.

Alternatively, Mirus et al teaches structural components 'a', 'c' and 'd' and White teaches the structural component 'b' as discussed below.

Regarding structural component 'a', White teaches a substrate (Fig. 1, pg. 6, section 2.0).

Regarding structural component 'b', White teaches providing a positively charged electrostatic layer having the positively charged compound polyallylamine (Figs. 2 and 4 and pgs. 8-9).

Regarding structural component 'c', White teaches providing a chemically modifying layer (i.e., a polyacrylic acid layer) on the electrostatic layer by introducing a carboxyl functional group capable of covalently binding to a nucleic acid molecule (Fig. 4, pgs. 8, 9 and 15).

Regarding structural component 'd', White teaches that the multilayer films comprise DNA (pg. 14, paragraph 1) and further teaches the covalent binding of molecules to the solid surface (pg. 15, paragraph 3). White does not explicitly teach a DNA molecule covalently bound to the chemically modifying layer.

Regarding claim 19, White teaches that the polyallylamine compound has an unsubstituted amino group, which adopts a loop conformation at pH 5.0 and the top of the loop does not bind to the substrate (Fig. 4, compare at binding of polyallylamine at pH 5 vs. pH 6.5 and pg. 9), which is reasonably interpreted as a polyallylamine layer does not bind to the substrate covalently.

Regarding claim 20, White teaches that the electrostatic layer includes a polyallylamine compound having an amino group and covalently binds to the substrate (pg. 27, paragraph 2). White also teaches that the polyallylamine compound has an unsubstituted amino group, which adopts a loop conformation at pH 5.0 and the top of the loop does not bind to the substrate (Fig. 4, compare at binding of polyallylamine at pH 5 vs. pH 6.5 and pg. 9), which is reasonably interpreted as polyallylamine compound containing an amino group has an amino group at the terminus to which the substrate does not bind.

Regarding claim 31, White clearly suggest that the nucleic acid molecules are immobilized on the solid support (pg. 14, paragraph 1) but do not teach immobilizing the nucleic acid molecules as a spot.

Regarding claim 32, White teaches that the thickness of the polyallylamine layer (i.e., the electrostatic layer) is 80 Angstroms (i.e., 8 nm), which is in the range of 1 nm to 500 microns (Fig. 4 and pg. 9, paragraph 1).

As described above, White suggests that the nucleic acid binds to the substrate. White does not explicitly teach a nucleic acid molecule bonded covalently to the chemically modifying layer.

However, a nucleic acid molecule bonded covalently to the chemically modifying layer and immobilizing nucleic acid as a spot were known in the art before the claimed invention was made as taught by Mirus et al.

Like, White, Mirus et al teaches a solid support for nucleic acid immobilization comprising following structural components.

Regarding structural component 'a', Mirus et al teaches a substrate (pg. 5, line 3).

Regarding structural component 'b', Mirus et al teaches that the substrate comprises 3-aminopropyltriethoxysilane, which provides a surface with functional groups capable of reacting with a polyanion (pg. 5, lines 3-15). The silane compound on the substrate surface of Mirus et al encompasses a layer. Mirus et al explicitly do not teach an electrostatic layer comprising a positively charged compound on the substrate.

Regarding structural component 'c', Mirus et al teaches that the substrate surface comprising silane compound reacts with polyanion compounds and further teaches that the polyanion compound is polyacrylic acids having a carboxyl functional group capable of covalently binding to a nucleic acid (pg. 3, lines 3-10). The polyacrylic acids reacting

with silane compound on the substrate surface of Mirus et al encompasses a chemically modifying layer on the silane layer.

Regarding structural component 'd', Mirus et al teaches that the nucleic acid molecule bonded covalently to the carboxyl functional group of polyacrylic acid, i.e., "a chemically modifying layer" (pg. 3, lines 7-10).

Mirus et al also teaches that the nucleic acid molecule is immobilized as a spot (pg. 10, lines 3 and 29-30, limitation of claim 31).

Both White and Mirus et al teaches that the substrate comprises glass (White, pg. 34, lines 3-4; Mirus et al pg.3, lines11-12). As described above, White teaches that the substrate comprises a polyallylamine (i.e., an electrostatic layer), polyacrylic acid layer (i.e., chemically modifying layer) and nucleic acid molecule. Mirus et al teaches that the substrate comprises a layer of silane and a layer of polyacrylic acid containing carboxyl functional groups (i.e., a chemically modified layer) for covalent binding of the nucleic acid molecule.

Thus, the combined teachings of White in view of Mirus et al or alternatively Mirus et al in view of White meet the limitations of the structural components of instant claim 17, because, as described above, the structural components of the solid support not taught by White are taught by Mirus et al and alternatively the structural components of the solid support not taught by Mirus et al are taught by White.

Mirus et al also teaches that the covalent binding of nucleic acids increases the concentration of the nucleic acids irrespective of their size on the support, thereby enhancing the sensitivity of target detection (Tables 1-4, pg. 15, lines 9-13).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to modify the nucleic acid immobilization to the substrate of White with the covalent attachment of nucleic acid with the substrate of Mirus et al with a reasonable expectation of success.

An artisan having ordinary skill in the art would be motivated to modify the nucleic acid immobilization to the substrate of White with the expected benefit of covalent binding of nucleic acids to the substrate thereby increasing the concentration of the nucleic acids irrespective of their size on the support, thereby enhancing the sensitivity of target detection as taught by Mirus et al (Tables 1-4, pg. 15, lines 9-13).

Alternatively, it would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to modify the silane layer of Mirus et al with the electrostatic layer of polyallylamine of White with a reasonable expectation of success.

An artisan having ordinary skill in the art would be motivated to modify the silane layer of Mirus et al with the expected benefit of having polyallylamine layer on the substrate to customize the physiochemical properties of the substrate surface by simply by altering the pH for a variety of applications as taught by White (pg. 9, last paragraph and pg. 10, first paragraph).

Mirus et al teaches that substrate comprising amino groups are commercially available (pgs. 8 and 9) and further teaches modifying the amino group containing substrate with polyacrylic acids for covalently attaching the nucleic acid molecules for increasing the concentration of nucleic acids on the substrate. White explicitly teaches a substrate comprising polyallylamine and polyacrylic acid layers are very useful for DNA

sensors. Therefore, the claimed solid support is obvious over White and Mirus et al because they teach the structural components of the claimed solid support (MPEP 2114).

12. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over White (Thesis submitted to MIT, June 2002, pgs. 1-49, publication date June 17,2002) in view of Mirus et al (WO 01/02538 published Jan. 11, 2001) as applied to claims 17 and 19 as above and further in view of Woo et al (USPN 5,929,194 issued July 27, 1999).

The following is a new rejection.

The teachings of White and Mirus et al regarding claims 17 and 19 are described above in section 11.

Regarding claim 21, White teaches a variety of amino groups containing compounds including polyallylamine (Figs. 2 and 4 and pgs. 8-9). Mirus et al teaches substrate comprising amino groups and further teaches that they are commercially available (pgs. 8 and 9). White and Mirus et al do not teach the amino group containing compound polyarylamine. However, the amino group containing compound polyarylamine was known in the art at the time of the claimed invention was made as taught by Woo et al.

Woo et al teaches a polyarylamine compound for coating the glass substrate and forming films on the substrate carrying positive charges (column 1, line 60 and column 4, lines 8-10). Woo et al further teaches that the coating with the polyarylamine makes the substrate solvent resistant (column 4, lines 10-11, column 14, lines 13-17).

It would have been prima facie obvious to one having the ordinary skill in the art at the time the claimed invention was made to modify the amino group containing compound of White with the polyarylamine compound of Woo et al with a reasonable expectation of success.

An artisan having ordinary skill in the art at would be motivated to modify the amino group containing compound of White with the expected benefit of having the polyarylamine compound for coating the substrate for making the substrate solvent resistant as taught by Woo et al (column 14, lines 13-17).

Response to Remarks from Applicants

Claim rejections under 35 U.S.C. § 103(a)

13. Applicant's arguments filed May 17, 2010 with respect to claims 17, 19, 20 and 31 as being unpatentable over Iwaki el in view of Mao et al have been fully considered (Remarks, pg. 2) and are moot in view of the withdrawn rejections.

Applicant's arguments with respect to claims 17, 19 and 21 as being unpatentable over Iwaki et al, Mao et al and Woo et al have been fully considered (Remarks, pg. 3) and are moot in view of the withdrawn rejections.

Applicant's arguments with respect to claims 17 and 32 as being unpatentable over Iwaki et al, Mao et al and Bertrand et al have been fully considered (Remarks, pg. 3) and are moot in view of the withdrawn rejections.

Applicant's arguments with respect to claims 17, 19, 20 and 31 as being unpatentable over Mao et al in view of Mirus et al have been fully considered (Remarks, pg. 4) and are not persuasive for the following reasons.

Applicant's arguments are based on Applicant's declaration that Mao's porous support is not suitable for DNA chip because the signals of the porous substrate lapped over considerably and needed longer blocking time and did not satisfy the required level of uniformity as compared to the claimed solid substrate (Affidavits, pg. 3). However, as discussed above in section 4, the example provided in the May 17, 2010 supporting document (Fig. 1) is not commensurate in scope with the invention as claimed because solid support used for the immobilization of DNA has been further modified with a DLC layer of 25 nm in thickness. Therefore the results presented by the Applicant are not commensurate in scope with the invention as claimed because the solid support used was different from the claimed solid support.

Furthermore, as described above in section 8, both Mao et al and Mirus et al teach a substrate modified by compounds having amino group (i.e., the electrostatic layer) and further modified by polyacrylic acid to introduce carboxyl functional groups, i.e., "the chemically modifying layer." Mirus et al teaches that the carboxyl functional group of polyacrylic acid binds the nucleic acids covalently to the substrate. Thus the solid support of Mao et al in view of Mirus et al comprises the structural components of the solid support as claimed thereby meeting the limitations of the claim (MPEP 2114). For these reasons the arguments are not persuasive.

Applicant's arguments with respect to claims 17, 19 and 21 as being unpatentable over Mao et al, Mirus et al and Woo et al are based on the affidavits of the Applicant (Remarks, pg. 4). These arguments are not persuasive because as described above in section 4, Applicant's affidavits and support documents are not commensurate

in scope with the claimed invention. Therefore arguments are not persuasive for the same reasons as described above.

Applicant's arguments with respect to claims 17 and 32 as being unpatentable over Mao et al, Mirus et al and Bertrand et al are based on the affidavits of the Applicant (Remarks, pg. 5). These arguments are not persuasive because as described above in section 4, Applicant's affidavits and support documents are not commensurate in scope with the claimed invention. Therefore arguments are not persuasive for the same reasons as described above.

Conclusion

14. No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Narayan K. Bhat whose telephone number is (571)-272-5540. The examiner can normally be reached on 8.30 am to 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Nguyen can be reached on (571)-272-0763. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Narayan K. Bhat/

Examiner, Art Unit 1634

/Robert T. Crow/

Primary Examiner, Art Unit 1634